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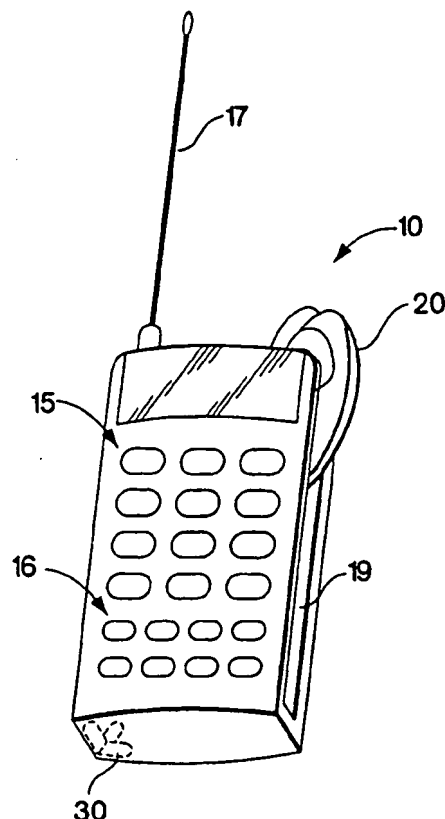
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(54) Title: SHORT-RANGE MAGNETIC COMMUNICATION SYSTEM

(57) Abstract

A system and method communicate signals between a portable unit and a communications system. The portable device communicates with a base unit using inductive coupling. The base unit is further connected to a wider communication system such as a telephone network. Multiple, orthogonally arranged transducers are used in the base unit to provide a more complete magnetic field and to prevent mutual inductance nulls which are otherwise present in a magnetic field. The use of short-range inductive coupling minimizes the power requirements and limits interference with other sources. The inductive coupling may also be used to recharge a battery in the portable device.



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SHORT-RANGE MAGNETIC COMMUNICATION SYSTEM

Background of the Invention

1. Field of the Invention

5 The present invention relates to short-range wireless communication systems, and more particularly to systems utilizing inductive coupling.

2. Discussion of the Related Art

 When using a telephone, continually holding the handset to one's ear can be awkward.
10 Also, holding the telephone interferes with the use of both hands for other work while trying to talk. In particular, the use of cellular telephones, which has increased dramatically, can interfere with the user's proper operation of an automobile. Various techniques have been used to overcome these difficulties.

 Speakerphones allow one to talk while roaming around a room and using one's hands.
15 However, speaker volume can disturb others around the user. They also cannot be used in close proximity to other speakerphones due to interference. They have limited privacy since the speaker broadcasts the conversation to all within earshot. Typically, the user must speak more loudly than normal to have proper reception at the microphone. Also, they tend to have poor sound quality because the user is not near the microphone and acoustics in the room are poor.

20 Headsets have been another way to free up the hands of a telephone user. Typically, the headset includes an adjustable strap extending across the user's head to hold the headset in place, at least one headphone located by the user's ear, and a microphone which extends from the headset along and around the user's face to be positioned in front of the user's mouth. The headset is attached by a wire to the telephone. Headsets have the disadvantages of being bulky
25 and somewhat awkward to use. Although they permit hands free use of the telephone, the user has limited mobility due to the connecting wire.

 Wireless headsets have also been developed which eliminate the connecting wire to the telephone. The wireless headset uses radio frequency (RF) technology or infrared technology for communicating between the headset and a base unit connected to the telephone. The need for
30 communications circuitry and sufficient power to communicate with the base unit increases the bulk and weight of the headset. This increased weight can become tiresome for the user. One alternative has been to attach the headset by a wire to a transmitting unit worn on the belt of the

user. As with wired headsets, the wire can become inconvenient and interfere with other actions by the user. Significant interference rejection circuitry is also needed when multiple wireless headsets are used in close proximity.

Therefore, a wireless communication system for telephones is desired with will provide
5 greater convenience and comfort for the user.

Summary of The Invention

The deficiencies of prior art systems are overcome by the present invention which, in one aspect, includes a short-range, wireless communication system including a miniaturized portable
10 transceiver and a base unit transceiver. The miniaturized portable transceiver sends and receives information through magnetic induction to the base unit, which may also be portable. Similarly, the base unit sends and receives information through magnetic induction to the portable transceiver. The information can be voice, data, music, or video. Use of magnetic induction fields reduces the power requirements and thus allows a smaller size and greater convenience.

15 In another aspect of the present invention, the base unit may include multiple, orthogonally arranged transducers for generating multiple magnetic fields. The multiple fields substantially eliminates mutual inductance nulls between the base unit and portable unit which result at certain positions in a generated field. In another aspect of the present invention, the multiple transducers may be selectively operated based upon a strongest signal, in order to limit
20 power consumption.

In another aspect of the present invention, a headset contains the miniaturized transceiver which communicates with the base unit through magnetic induction fields. The information sent between the headset and the base unit may be voice or data. In another aspect of the present invention, the headset may be of the concha type in which the speaker fits into the user's ear
25 without a strap across the head and the transceiving transducer is encapsulated into the microphone boom which is short and straight along the user's cheek. In another aspect of the invention, the base unit may be a portable telephone, which can be attached to the user, to further transmit communications from the wireless communication system to a cellular telephone network or a cordless telephone unit.

30 In another aspect of the invention, the headset may fit in a receptacle in the portable base unit in order to recharge the battery in the headset. In another aspect of the invention, the battery may be recharged via the magnetic inductive link between the base unit and the headset.

With these and other objects, advantages and features of the invention that may become apparent, the nature of the invention may be more clearly understood by reference to the following detailed description of the invention, the appended claims and the several drawings attached hereto.

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Brief Description of The Drawings

Fig. 1 illustrates schematically the wireless communication system of the present invention.

Fig. 2 illustrates a telephone handset as the base unit in the communication system of Fig. 1.

Fig. 3 illustrates a headset that is utilized as the portable device in the communication system of Fig. 1.

Fig. 4 illustrates schematically the transducer and electronics of the portable device.

Fig. 5 illustrates schematically the transducer and electronics of the base unit.

Fig. 6 illustrates an alternative transducer configuration for the base unit.

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Detailed Description

Fig. 1 illustrates schematically a short-range magnetic communication system 1 including a portable device 2 and a base unit 1, which connects to a long-range communication network 14.

Contained within each of the base unit 1 and the portable device 2 is a short-range miniaturized magnetic induction transceiver 11, 12, which can simultaneously transmit and receive communications signals 13. These signals may be voice, audio, data, or video. The communications network 14 may be any network in which it would be desirable for these signals to be communicated over a terminal link without wires, such as a telephone network, personal communications (PCS) network, special mobile radio (SMR) network, computer system or network, and video conferencing systems. The base unit 1 may any part of the communications network 14 from which it would be desirable to communicate to another device without wires: for example, it may be a telephone handset, PCS handset, SMR handset, walkie-talkie, computer or computer peripheral devices, personal digital assistant (PDA), or video game controller. The portable device 2 may be any device from which it would be desirable to communicate without wires to a communications network: for example, it may be a telephone headset or handset, portable computer or computer peripheral device, headphone, or video input device.

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As illustrated in Fig. 2, one example of the base unit 1 is a portable telephone 10 having a plurality of number buttons 15 and a plurality of function buttons 16. A retractable antenna 17 communicates with a cellular telephone network or a cordless telephone base unit. The portable telephone 10 operates in a manner similar to that of an ordinary cellular or cordless telephone handset. Signals are sent to and received from the telephone network in an ordinary manner. The portable telephone 10 includes a transducer system 30 which communicates by magnetic induction with headset 20, which operates as the portable device 2, to provide the outputs and inputs to the portable telephone 10. The portable telephone 10 may also include a mouthpiece or earpiece (not shown) as in a regular telephone handset, allowing the user to choose between a conventional method of operation and a hands-free use afforded by the headset 20.

The portable device 2 as a headset 20 is illustrated more fully in Fig. 3. It includes a body portion 23 which houses a transducer 40 and processing circuitry. A speaker 22 is connected to the circuitry within the body 23. An earpiece 21 next to the speaker 22 fits in the user's ear to hold the unit in place and to allow the user to hear sounds from the speaker. A microphone boom 24 extends from the body 23 several inches in order to place a microphone 25, located at the end of the boom 24, close to the user's mouth. Alternatively the transducer 40 may be housed in the boom 24. A rechargeable battery 51 is also housed in the body 23 of the headset 20 to provide power to the headset. Other features may be optionally included in the headset 20, such as switcher or buttons for manually activating different modes. For example, a capacitive switch or push-button could be used to cause the headset 20 to transmit a control signal to the portable phone 10 to activate muting of the microphone. The portable phone 10 may include a receptacle 19 for receiving and holding the headset 20. Depositing the headset in the receptacle can provide a variety of functions, in addition to maintaining the headset 20 and portable phone 10 together. A switch can be disposed in the receptacle to terminate the telecommunication when the headset 20 is inserted or initiate the telecommunication when it is removed. The receptacle may also include connections to recharge the battery 51 in the headset 20.

The base unit 1 and portable device 2 communicate through amplitude modulation of inductive fields, although other modulation methods such as frequency or phase modulation could be employed. During use, the distance between the portable device 2 and the base unit 1 typically is short. Since the distance is short, only an inductive field is necessary, and little or no radiation occurs. This limits the operating power, which allows a smaller size and weight for the

rechargeable battery 51 and, thus, the portable device 2. Furthermore, it limits interference between systems operating in close proximity. Therefore, interference rejection circuitry may be limited or not necessary in the portable device 2.

The transducer system in the portable device 2 is illustrated schematically in Fig. 4. The transducer 40 preferably includes a ferrite rod transducer having a ferrite rod 41 within a wire coil 42. The wires from the transducer 40 are connected to a transceiver 27 having transmitter electronics 28 and receiver electronics 29. The transceiver 27 connects to the portable device electronics 26, the nature of which is dependent upon the function of the portable device 2. In the example of the portable device as a headset 20, the portable device electronics would connect to a speaker 22 and a microphone 25. Transmission and reception can occur at different frequencies, which permits full duplex operation. Alternatively, separate transmitting and receiving transducers can be used.

The base unit 1 configuration is illustrated schematically in Fig. 5. The transducer system 30 includes three orthogonally disposed ferrite rod transducers, each including a ferrite rod 31, 32, 33 and a respective coil 34, 35 and 36. The use of the orthogonally disposed transducers overcomes the occurrence of mutual inductance nulls in the resulting inductive fields. The three transducers are connected to multiplexer electronics 60 for selecting one or more of the transducers for transmission and reception. Circuitry may be used to select the transducer or transducers having the strongest signal for transmission and reception to reduce the total power consumption of the device. The transmitter electronics 61 and receiver electronics 62 provide for processing of the communications signals from the base unit electronics 70 and the portable device 2. As discussed above, for a portable telephone 10, the conventional telephone speaker 71 and mouthpiece 72 may be eliminated so that the portable telephone 10 solely uses the headset 20 through the transducer system for communicating to the user. Switching circuitry (not shown) would be included to select between the speaker 71 and microphone 72, and the headset 20. The switching circuitry could be included in the receptacle 19 so that the speaker 71 and microphone 72 are disconnected when the headset 20 is removed.

Fig. 6 illustrates a second embodiment of the transducer system for the base unit 1. In the transducer 30 of Fig. 6, one of the ferrite rod transducers is replaced with a loop coil transducer 37. A loop coil transducer can replace any or all of the ferrite rod transducers. The loop coil transducer 37 is disposed in the plane of the remaining ferrite rod transducers. This creates a transducer system having a decreased depth. As illustrated in Fig. 2, the three orthogonal

transducers can be placed in a corner along the sides of the portable telephone 10. Alternatively, the loop coil transducer 37 could be placed along the back of the portable phone 10, so that it could be made thinner.

Additionally, the transmission system can be used for charging the battery 51 of the portable device 2. The base unit 1 includes a battery charger signal generator 52 connected to the transmitter 61. This generator 52 produces a recharging signal which is sent through one of the ferrite rod transducers in the base unit 1 to the ferrite rod transducer 40 of the portable device 2. Since in the telephone embodiment of Fig. 2, the headset 20 and transducer 40 have a known orientation when in the receptacle 19, only one transducer in the portable telephone 10 needs to be energized to inductively transmit the recharging signal. As illustrated in Fig. 3, the wires from the transducer 40 in the portable device 2 are connected to a battery charger 50 which is used to charge the battery 51.

Although the communication system of the present invention has been illustrated in connection with a concha type headset 20 and a cellular or cordless telephone handset 10 as a base unit 1, it is readily adaptable for other types of headsets and uses. The headset can be of the over-the-head type, over-the-ear type, or binaural type. The system can be used as a wireless connection to a conventional desktop telephone. Such a system would operate in the manner discussed above with the cordless handset. Since several such units may be used in close proximity, interference may become more of a problem. Therefore, the system can be designed to operate on various frequencies and can select frequencies for the transmission and reception which are unlikely to have significant interference. Similarly, the system can be used with a computer, either stationary or portable, for voice data entry, sound transmission, and telephone functions. The system can also be used with other types of communication systems, including personal digital assistants (PDA's), cordless phones, PCS and SMR cellular phones, two way (video games), two-way half duplex (walkie-talkies, CBs), or two-way full duplex (phones). When the base unit is stationary and the user is likely to be at certain locations relative to the base unit, fewer transducers may be used in the base unit without encountering mutual inductance nulls. Alternative transducer systems may also be used for generating the inductive fields. Specifically, rather than a single transducer for transmission and reception on different frequencies, separate transducers may be used.

Having thus described one illustrative embodiment of the invention, various alterations, modifications, and improvements will readily occur to those skilled in the art. Such alterations,

modifications, and improvements are intended to be within the spirit and scope of the invention. Accordingly, the foregoing description is by way of example only and is not intended as limiting. The invention is limited only as defined in the following claims and equivalent thereto.

CLAIMS

1. A communications system comprising:
a base unit, including:
a base unit input for inputting first signals.
5 a base unit output for outputting second signals, and
a base unit transducer system connected to said input for generating a first inductive field based upon said first signals and connected to said output for converting a second inductive field into said second signals;
a portable unit including:
10 a portable unit input for inputting third signals,
a portable unit output for outputting fourth signals, and
a portable unit transducer system connected to said portable unit input for generating said second inductive field based upon said third signals, and connected to said portable unit output for converting said first inductive field into said fourth signals; and
15 wherein the base unit transducer system and the portable unit transducer system operate so that said first inductive field and said second inductive field may be concurrently generated and converted.
2. The communications system of claim 1, wherein said base unit is connected to a
20 communications network for inputting said first signals from and outputting said second signals to said communications network.
3. The communications system of claim 1, wherein said portable unit is a headpiece, wherein said portable unit input is a microphone, and wherein said portable unit output is a
25 speaker.
4. The communications system of claim 1, wherein said base unit transducer system includes:
a plurality of orthogonal transducers; and
30 selection means for selectively energizing at least one of said plurality of orthogonal transducers.

5. The communications system of claim 1, wherein said first inductive field includes a first carrier frequency, and wherein said second inductive field includes a second carrier frequency having a different frequency than said first carrier frequency.

5 6. The communications system of claim 1, wherein said base unit transducer system includes a transmitter transducer for generating said first inductive field and a receiver transducer for converting said second inductive field into said second signals.

7. The communications system of claim 1, wherein said portable transducer system
10 includes a transmitter transducer for generating said second inductive field and a receiver transducer for converting said first inductive field into said fourth signals.

8. A communications system comprising:
a base unit communicating with a communications network, including:
15 a base unit input for inputting first signals from the communications network, and
a base unit transducer system connected to said input for generating a first inductive field based upon said first signals; and
a portable unit including:
a portable unit transducer system for converting said first inductive field into fourth
20 signals, and
a portable unit output connected to the portable unit transducer system for outputting said fourth signals.

9. The communications system of claim 8, wherein the portable unit further includes
25 a portable unit input for inputting third signals; wherein said portable unit transducer is connected to the portable unit input for generating a second inductive field based upon said third signals; wherein said base unit further includes a base unit output for outputting second signals to said communications network, and wherein the base unit transducer is connected to the base unit output for converting said second inductive field into said second signals.

30 10. The communications system of claim 8, wherein said communications network is a telephone system.

11. The communications system of claim 8, wherein said communications network is a cellular telephone system.

12. The communications system of claim 8, wherein said base transducer system
5 includes at least one ferrite rod transducer.

13. The communications system of claim 8, wherein said base transducer system includes at least one loop transducer.

10 14. The communications system of claim 8, wherein said headpiece transducer system includes at least one ferrite rod transducer.

15 15. The communications system of claim 8, wherein said base unit further includes a receptacle for attaching said portable unit to said base unit.

16. The communications system of claim 15, wherein said receptacle includes means for disconnecting said base unit from said communications network when said portable unit is attached to said base unit.

20 17. The communications system of claim 15, further comprising charging means for charging a battery in said portable unit when said portable unit is attached to said base unit.

18. The communications system of claim 8, further comprising charging means for charging a battery in said portable unit.

25 19. The communications system of claim 18, wherein said charging means includes: generation signal means in said base unit for generating a third inductive field; and charging signal means in said portable unit for converting said third inductive field into a signal for charging said battery.

30 20. The communications system of claim 8, wherein said base unit transducer system includes:

a plurality of orthogonal transducers; and
selection means for selectively energizing at least one of said plurality of orthogonal transducers.

5 21. The communications system of claim 9, wherein said first inductive field includes a first carrier frequency, and wherein said second inductive field includes a second carrier frequency having a different frequency than said first carrier frequency.

 22. The communications system of claim 9, wherein said base unit transducer system
10 includes a transmitter transducer for generating said first inductive field and a receiver transducer for converting said second inductive field into said transmitted communications signals.

 23. The communications system of claim 9, wherein said portable unit transducer system includes a transmitter transducer for generating said second inductive field and a receiver
15 transducer for converting said first inductive field into said received audio signals.

 24. A method for communicating with a communications network, said method comprising the steps of:

 inputting first signals from said communications network;
20 generating a first inductive field based upon said first signals; and
 converting said first inductive field into fourth signals.

 25. The method of claim 24, further comprising the steps of:
 receiving third signals;
25 generating a second inductive field based upon said third signals;
 converting said second inductive field into second signals; and
 outputting said second signals to said communications network.

 26. The method of claim 24, wherein said fourth signals are sounds.

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 27. The method of claim 25, wherein said third signals are sounds.

28. The method of claim 24, wherein said communications network is a telephone system.

29. The method of claim 24, wherein said communications network is a cellular
5 telephone system.

30. A method for communicating comprising the steps of:
inputting first signals;
generating a first inductive field based upon said first signals; and
10 converting said first inductive field into fourth signals.
receiving third signals;
generating a second inductive field based upon said third signals;
converting said second inductive field into second signals;
outputting said second signals; and
15 wherein said first inductive field and second inductive field may be generated
concurrently.

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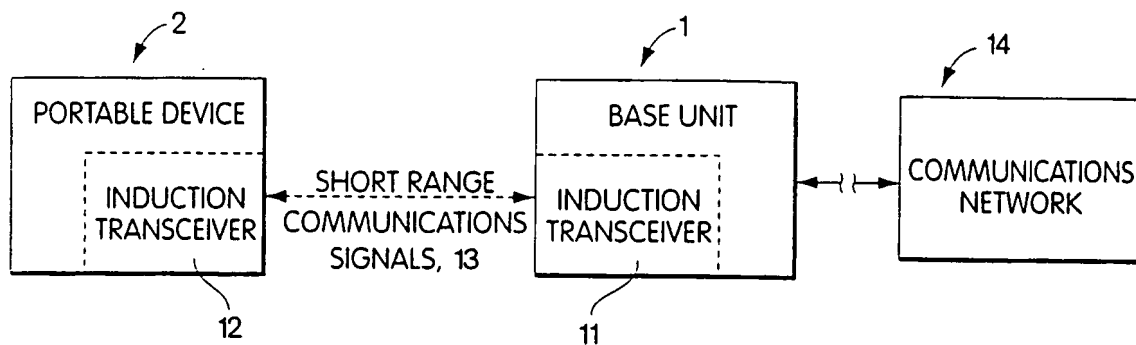


Fig. 1

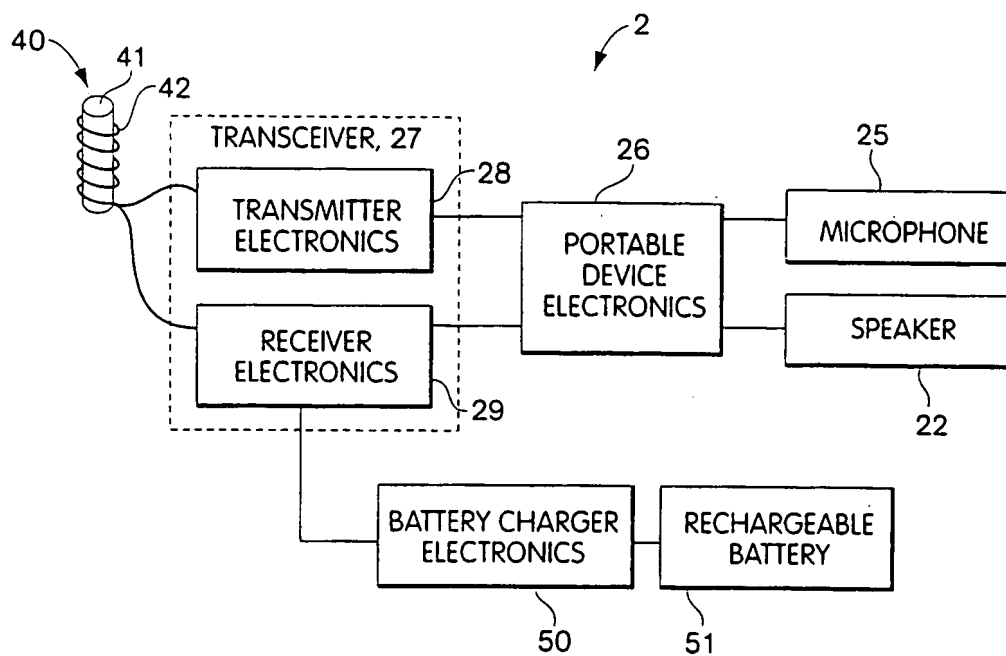


Fig. 4

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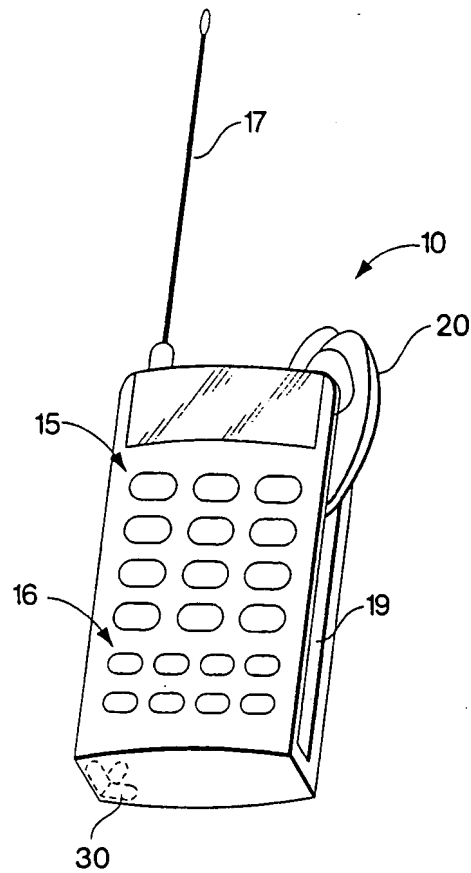


Fig. 2

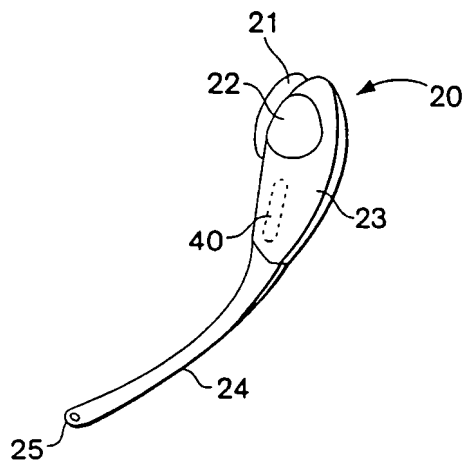


Fig. 3

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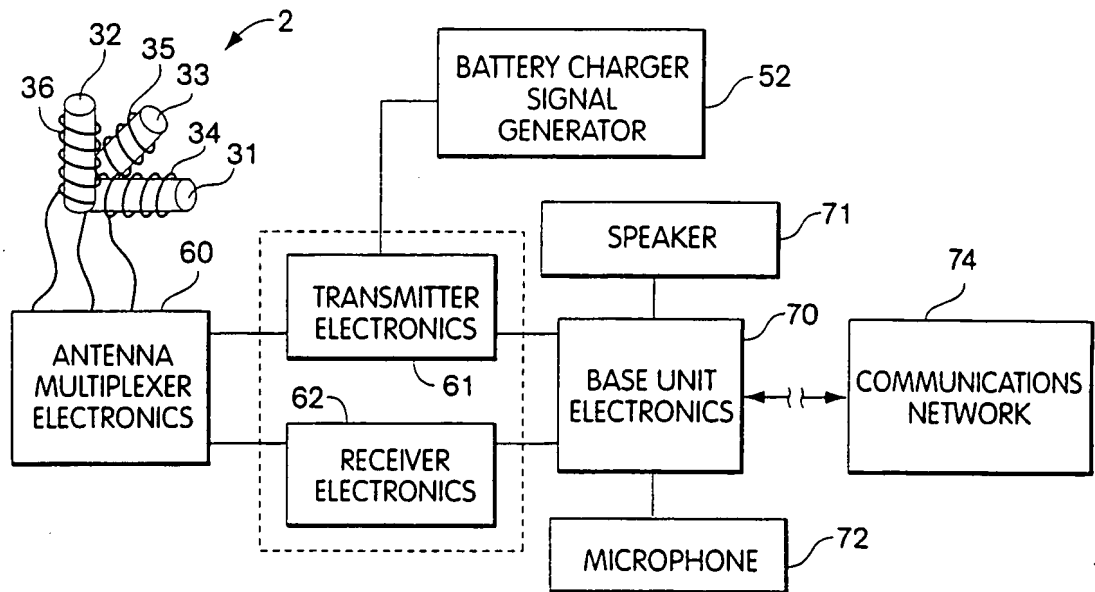


Fig. 5

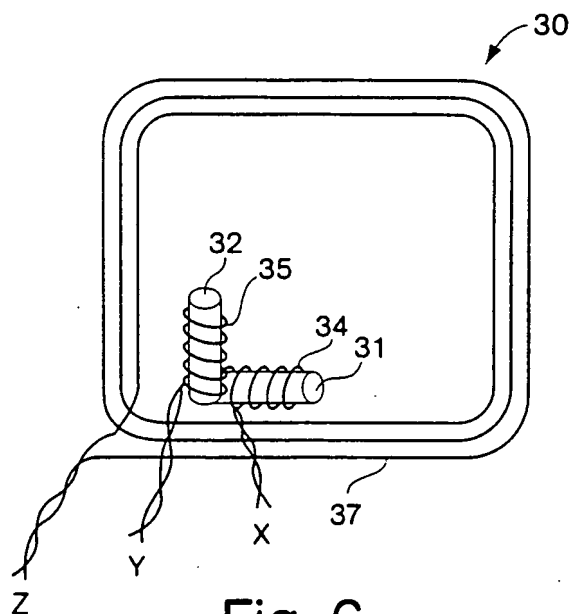


Fig. 6

INTERNATIONAL SEARCH REPORT

Inventor's Application No

PCT/US 96/07144

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04B5/02 H04M1/60

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04B H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB,A,1 164 281 (EMI) 17 September 1969 see page 1, line 37 - line 47 see page 2, line 46 - line 83 see page 3, line 75 - line 86 see page 3, line 114 - page 4, line 19 see page 5, line 67 - line 72 ---	1,2,5, 7-10, 13-15, 17-19, 21, 23-28,30
X	GB,A,2 197 160 (DATAPRODUCTS) 11 May 1988 see page 2, line 11 - line 121 --- -/--	1,3,5,6, 8,9,13, 30

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
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Date of the actual completion of the international search

4 September 1996

Date of mailing of the international search report

20.09.96

Name and mailing address of the ISA

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Authorized officer

Holper, G

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 96/07144

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE,A,36 03 098 (RADAKOVIC) 8 January 1987 see column 6, line 36 - line 59 ---	4,12,14, 20
A	FR,A,2 431 227 (ELECTRONIQUE MARCEL DASSAULT) 8 February 1980 see page 2, line 20 - line 40 ---	19
A	GB,A,2 277 422 (UNIVERSAL EXCHANGE LIMITED) 26 October 1994 see page 2, line 1 - line 6 see page 4, line 5 - line 9 see page 2, paragraph 4 ---	3,15
A	DE,U,93 09 032 (LACHNITT) 3 November 1994 see figure 4 -----	3,10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 96/07144

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB-A-1164281	17-09-69	NONE	
GB-A-2197160	11-05-88	US-A- 4747158	24-05-88
DE-A-3603098	08-01-87	NONE	
FR-A-2431227	08-02-80	NONE	
GB-A-2277422	26-10-94	NONE	
DE-U-9309032	03-11-94	NONE	

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

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2-18-99

To:

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125 High Street
Boston, MA 02110
UNITED STATES OF AMERICA

NOTIFICATION OF TRANSMITTAL OF
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OR THE DECLARATION

AMEND CLAIMS
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(PCT Rule 44.1)

1-18-99

Date of mailing
(day/month/year)

18/11/1998

Applicant's or agent's file reference

AUR-002PC

FOR FURTHER ACTION

See paragraphs 1 and 4 below

International application No.

PCT/US 98/07768

International filing date
(day/month/year)

22/04/1998

Applicant

AURA COMMUNICATIONS, INC.

1. ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicants's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority

European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Liliane Van Velzen-Peron

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference AUR-002PC	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/US 98/ 07768	International filing date (day/month/year) 22/04/1998	(Earliest) Priority Date (day/month/year) 23/04/1997
Applicant AURA COMMUNICATIONS, INC.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (see Box I).

2. ☐ Unity of invention is lacking (see Box II).

3. ☐ The international application contains disclosure of a nucleotide and/or amino acid sequence listing and the international search was carried out on the basis of the sequence listing

☐ filed with the international application.

☐ furnished by the applicant separately from the international application,

☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.

☐ Transcribed by this Authority

4. With regard to the title, ☒ the text is approved as submitted by the applicant

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this International Search Report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is:

Figure No. 1 ☐ as suggested by the applicant.

☐ None of the figures.

☒ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 98/07768

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6. H04B5/02 H04M1/60 H04R25/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04B H04M H04R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4 334 315 A (ONO HIROSHI ET AL) 8 June 1982 * abstract * see column 1, line 44 - column 2, line 16 see column 2, line 53 - column 4, line 16 see claims 1,4; figures 1,7-12 ---	1,7
Y	US 5 596 638 A (PATERSON GRAEME S ET AL) 21 January 1997 * abstract * see column 2, line 33 - column 3, line 42 see column 2, line 58 - column 4, line 13 see figure 1 --- -/--	1,7

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

11 November 1998

Date of mailing of the international search report

18/11/1998

Name and mailing address of the ISA

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Fax: (+31-70) 340-3016

Authorized officer

Lopez Marquez, T

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 98/07768

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 96 37052 A (AURA COMMUNICATIONS INC) 21 November 1996 * abstract * see page 2, line 8 - page 3, line 4 see page 5, line 4 - line 12 see page 6, line 13 - line 30 see claim 1; figures 1-6 -----	1,7
A	WO 96 10878 A (PHONIC EAR INC ;STROHALLEN GENE M (US); YOUNG ROBERT F (US)) 11 April 1996 * abstract * see page 1, line 19 - page 3, line 6 see page 8, line 22 - page 9, line 22 see claim 1; figures 1,27 -----	1,7

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 98/07768

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4334315 A	08-06-1982	JP 1220701 C	26-07-1984
		JP 55147095 A	15-11-1980
		JP 58050078 B	08-11-1983
		AU 5802080 A	06-11-1980
		CA 1139845 A	18-01-1983
		DE 3016671 A	13-11-1980
		FR 2455820 A	28-11-1980
		GB 2050768 A, B	07-01-1981
US 5596638 A	21-01-1997	US 5557653 A	17-09-1996
		US 5794163 A	11-08-1998
WO 9637052 A	21-11-1996	CA 2221364 A	21-11-1996
		CN 1190506 A	12-08-1998
		EP 0872032 A	21-10-1998
		US 5771438 A	23-06-1998
WO 9610878 A	11-04-1996	US 5568516 A	22-10-1996
		AU 3732795 A	26-04-1996
		EP 0809906 A	03-12-1997
		US 5774791 A	30-06-1998